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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/892,805	06/27/2001	Brian Lee	2001 P 11064US (8055-59)	3544

7590

09/12/2003

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EXAMINER

CYGAN, MICHAEL T

ART UNIT

PAPER NUMBER

2855

DATE MAILED: 09/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/892,805

Applicant(s)

LEE ET AL.

Examiner

Michael Cygan

Art Unit

2855

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamanaka (US 6,006,593) in view of Mizutani (US 6,304,319 B1) and in view of Weling (US 5,757,502). Yamanaka discloses a method and system for measuring physical properties of LSI (Large-Scale-Integrated Circuit) wafers with a cantilever comprising providing a feature (on a substrate such as a LSI wafer) having features of different elasticity, applying acoustic energy (i.e., stress) to the wafer by vibrating an AFM tip at an ultrasonic frequency, and scanning the sample wafer with the tip using optical deflection detection to determine the position and elasticity (i.e., stress fields caused by the applied stress) of surface features. See entire document, especially Figures 2, 3, and 8; column 2 lines 14-29;

column 3 lines 7-60; column 4 lines 40-57; column 5 lines 45-52; and column 8 lines 5-13. Yamanaka teaches the claimed invention except for aligning the feature with a feature on a mask, and that the substrate is a semiconductor.

With respect to the substrate being a semiconductor, Weling teaches that the "starting material for typical ICs is very high purity semiconductor". Since Yamanaka teaches the use of ICs (integrated circuit wafers) as the studied substrate, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use semiconductor ICs as taught by Weling in the invention taught by Yamanaka as the studied substrate, since Weling teaches that such material is "typical" in the art.

Mizutani teaches the formation of alignment features on a substrate and the application of AFM measurement to determine the position of surface features on substrates and aligning those features with marks on a mask using movement stages positioning substrate and mask; see abstract, column 1, lines 21-27; column 3, lines 41-55; and (for AFM measurement) column 10, lines 46-50. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use mask-substrate alignment steps as taught by Mizutani in the invention taught by Yamanaka to align LSI wafers with masks during processing, since Mizutani teaches that such mask-substrate alignment steps are "common" in the semiconductor manufacture art (see column 1, lines 21-

27) and thus would provide a desirable application for feature recognition methods.

With respect to AFM resolution of less than 20 nm as set forth in claims 8, 15, and 21, it is notoriously well known in the AFM art that features less than 20 nm can be resolved, and it would therefore have been obvious to one having ordinary skill in the art at the time the invention was made to provide an AFM capable of 20 nm resolution.

With respect to claims 6, 12, and 18, Yamanaka teaches the claimed invention except for pattern recognition. Weling teaches the use of optical pattern recognition to decipher the location of a surface feature on an integrated circuit chip in relation to the AFM; see column 7, lines 13-20 and Figure 10. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use pattern recognition as taught by Weling in the invention taught by Yamanaka to locate measured surface features using optical pattern recognition, since this is taught to allow alignment of the AFM probe (which measures sub-micrometer features of a substrate) to absolute x and y coordinates and thus be related to macroscopic features of a substrate.

Response to Arguments

2. Applicant's arguments with respect to claims 1-5, 9-11, 13, 16, 17, and 19 have been considered but are moot in view of the new ground(s) of rejection.
3. Applicant's arguments filed 30 July 2003 have been fully considered but they are not persuasive. Applicant argues that Mizutani teaches detection light and therefore teaches away (presumably, from the use of AFM detection) from the claimed invention. However, as set forth in the previous rejection, Mizutani teaches the use of AFM measurement at column 10, lines 46-50 as an alternative to optical detection means.
4. In response to applicant's argument that Weling is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Weling relates to the field of measuring the surface profile and alignment of semiconductor wafers using AFM, as does the instant application.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).
6. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.
7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Phan (US 6,559,457 B1) discloses aligning a semiconductor wafer with a wafer stage using a reference mark through AFM scanning.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cygan whose telephone number is 703-305-0846. The examiner can normally be reached on 8:30-6 M-Th, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on 703-305-4816. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

A handwritten signature in black ink, appearing to read 'Michael Cygan', with a stylized flourish at the end.

Michael Cygan
Examiner
Art Unit 2855